Bangladesh University of Engineering and Technology

Department of Electrical and Electronic Engineering

Course No.: EEE 414

Course Title: Electrical Service Design

Group No.: 03

Project Name: In Depth Analysis of Electrical Design of a 7 Storied Residential Building

PROJECT REPORT

Submitted to:

Mr. Yeasir Arafat

Associate Professor, Dept. of EEE, BUET

Ashiqur Rasul

Lecturer, Dept. of EEE, BUET

Submitted by:

1706007- Md. Rafiqul Islam Rafi

1706008- Sheikh Munim Hussain

1706009- Jahid Hasan Tushar

1706017- Md. Jahidul Hoq Emon

1706020- Shafin Shadman Ahmed

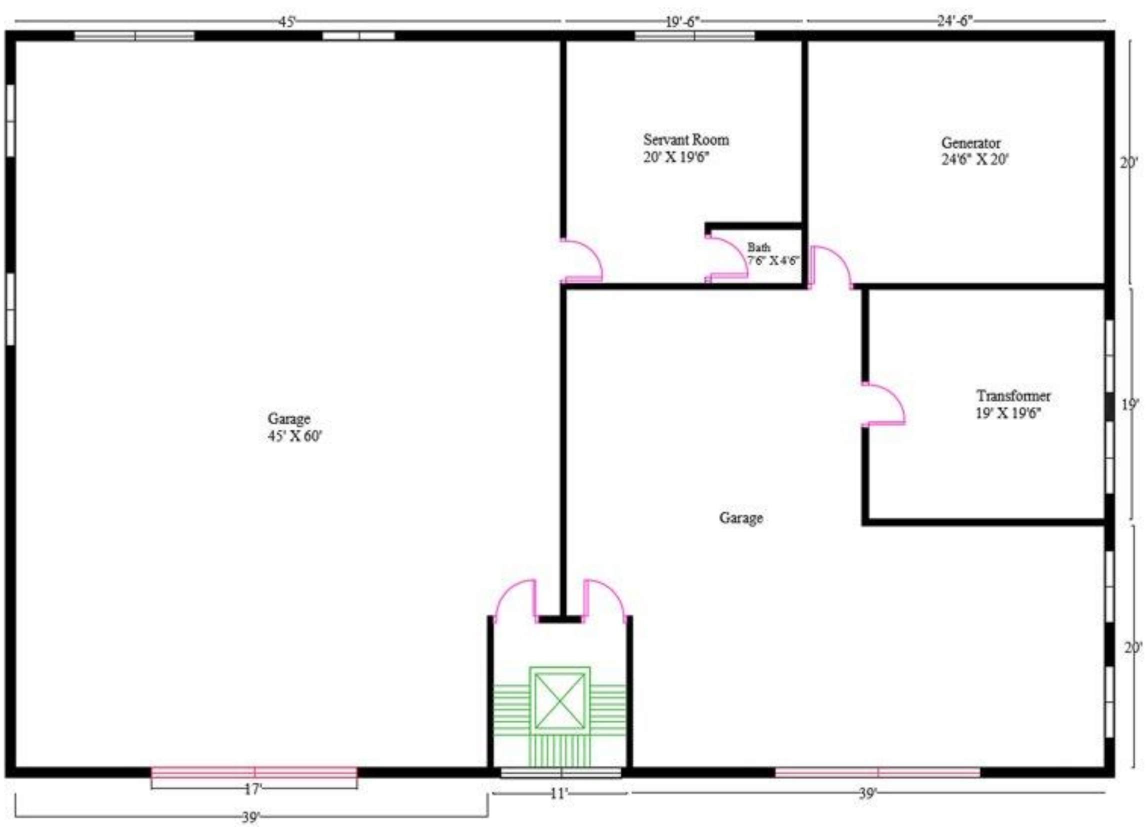
1706032- Ayan Biswas Pranta

1706033- Azazul Islam

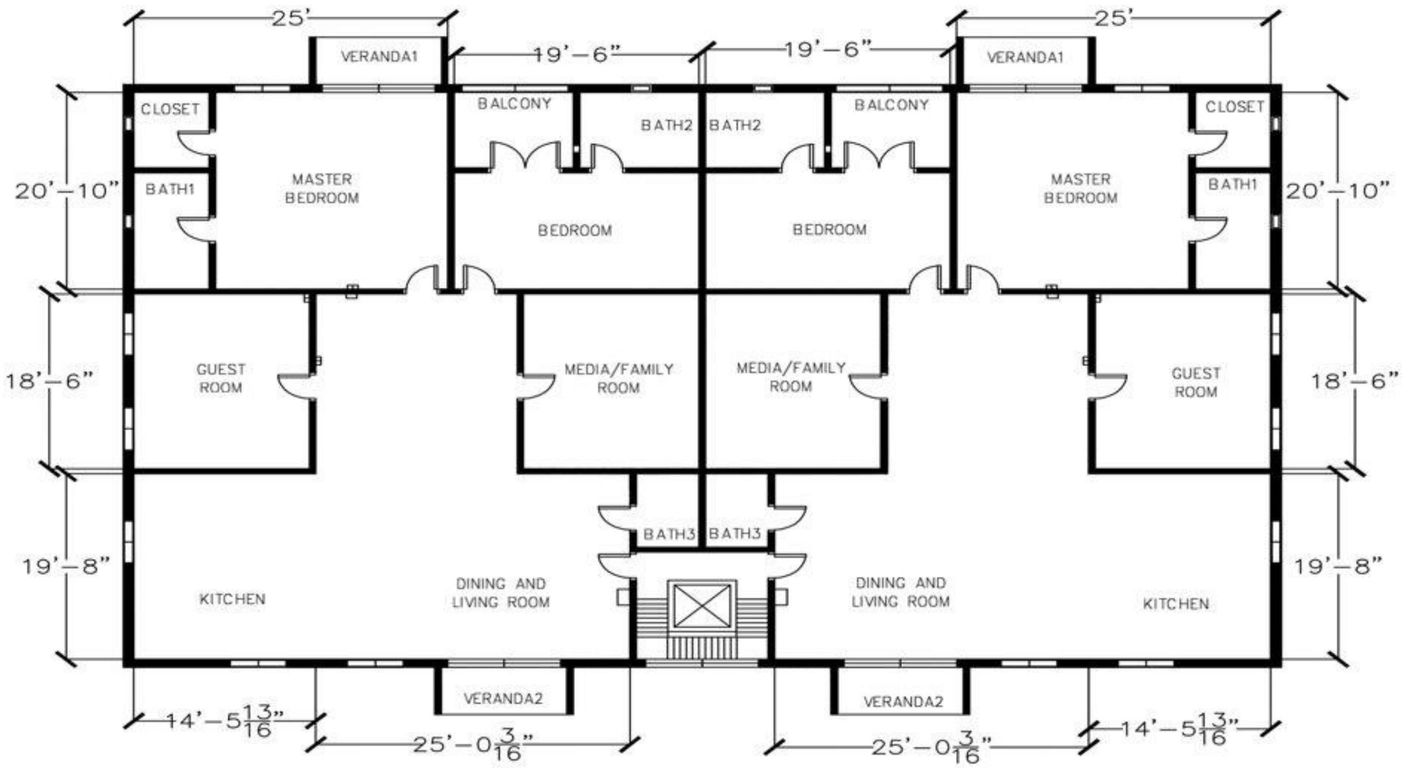
Objectives of Electrical Services Design

- To create proper environment for productive work and comfortable life.
- To provide benefits like energy supply, communication, ventilation, drainage system etc.
- To assure emergency supply under outage situation.
- To ensure appropriate protection in case any fault.
- To make suitable accommodation irrespective of difficulty or age

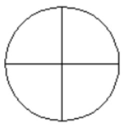
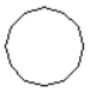
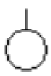
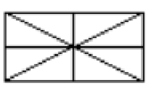
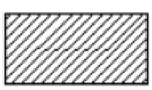
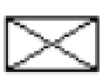
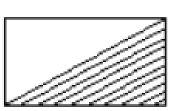
Floor Plan (Ground Floor)

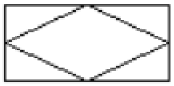
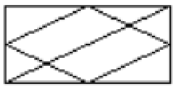
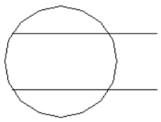
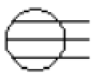
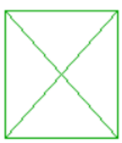
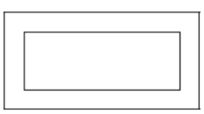


Floor Plan (Typical Floor)

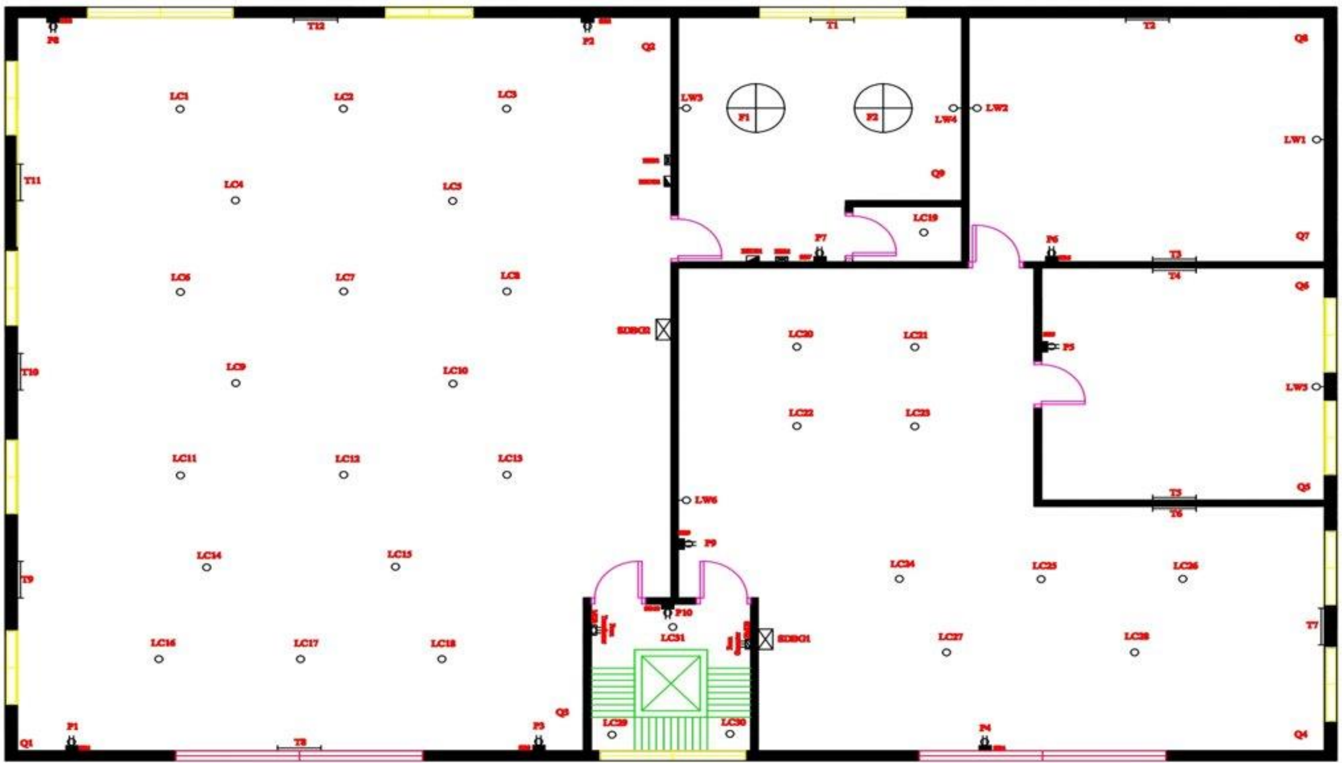


Electrical Appliances and Fixture/ Fittings Schedule:

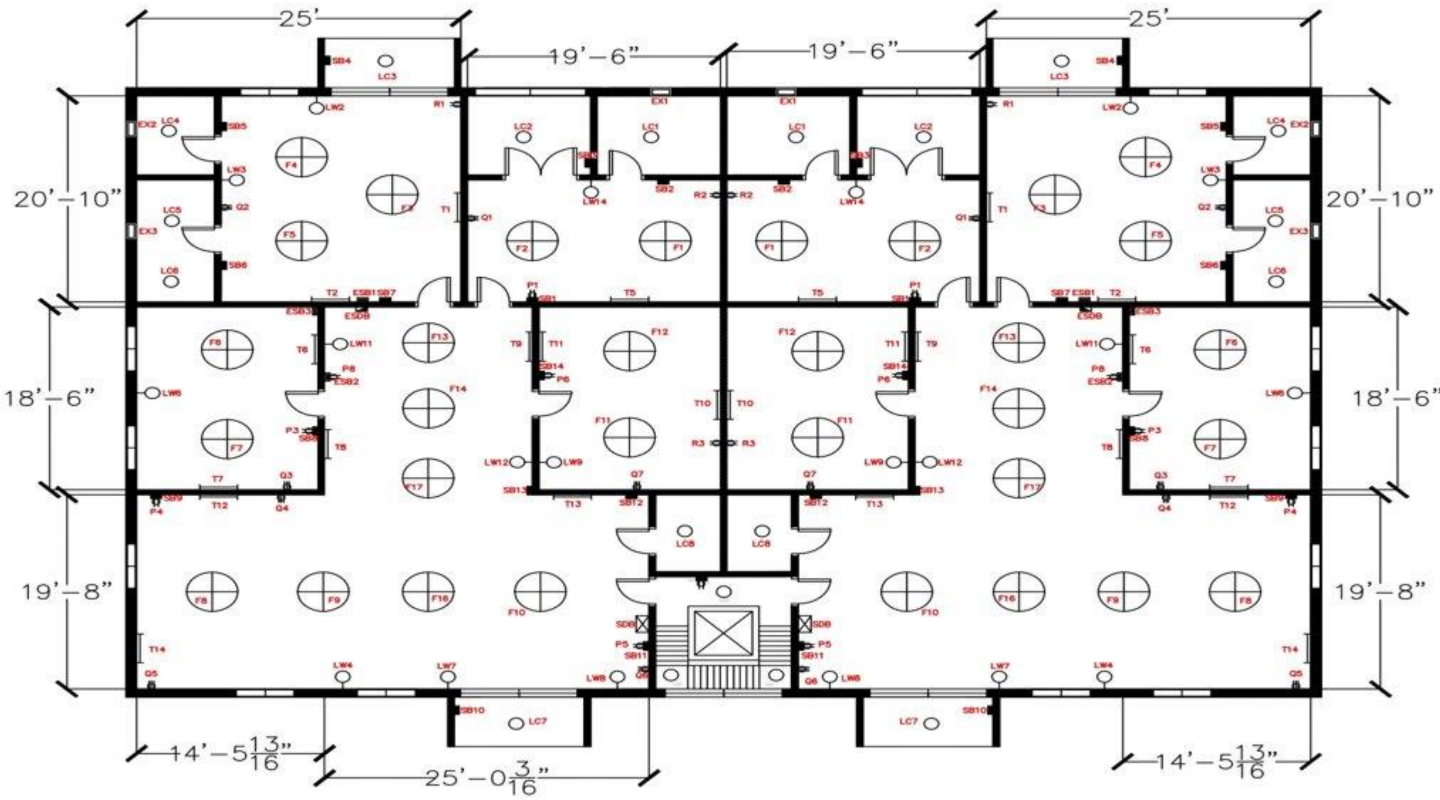
Fittings and Fixtures Symbol	Symbol Legend	Symbol Description	Power Rating
	F	4 Blade Fan	100W
	LC	Ceil Mounted Light Bulb	20W
	**LW**	**Wall bracket light at lintel level**	20W
	T	Tube Light	20W
	ESB	Emergency Switch Board	-
	SB	Switch Board	-
	SDB	Sub Distribution Board	-
	ESDB	Emergency Sub Distribution Board	-

	MDB	Main Distribution Board	-
	EMDB	Emergency Main Distribution Board	-
	P / R	2 pin 5 A socket at SB level	100W
	Q	**3 pin 5A/20A socket**	4000W
	-	Lift	18.5kW
	EX	Exhaust Fan	40W

Fitting and Fixtures Layout (Ground Floor)



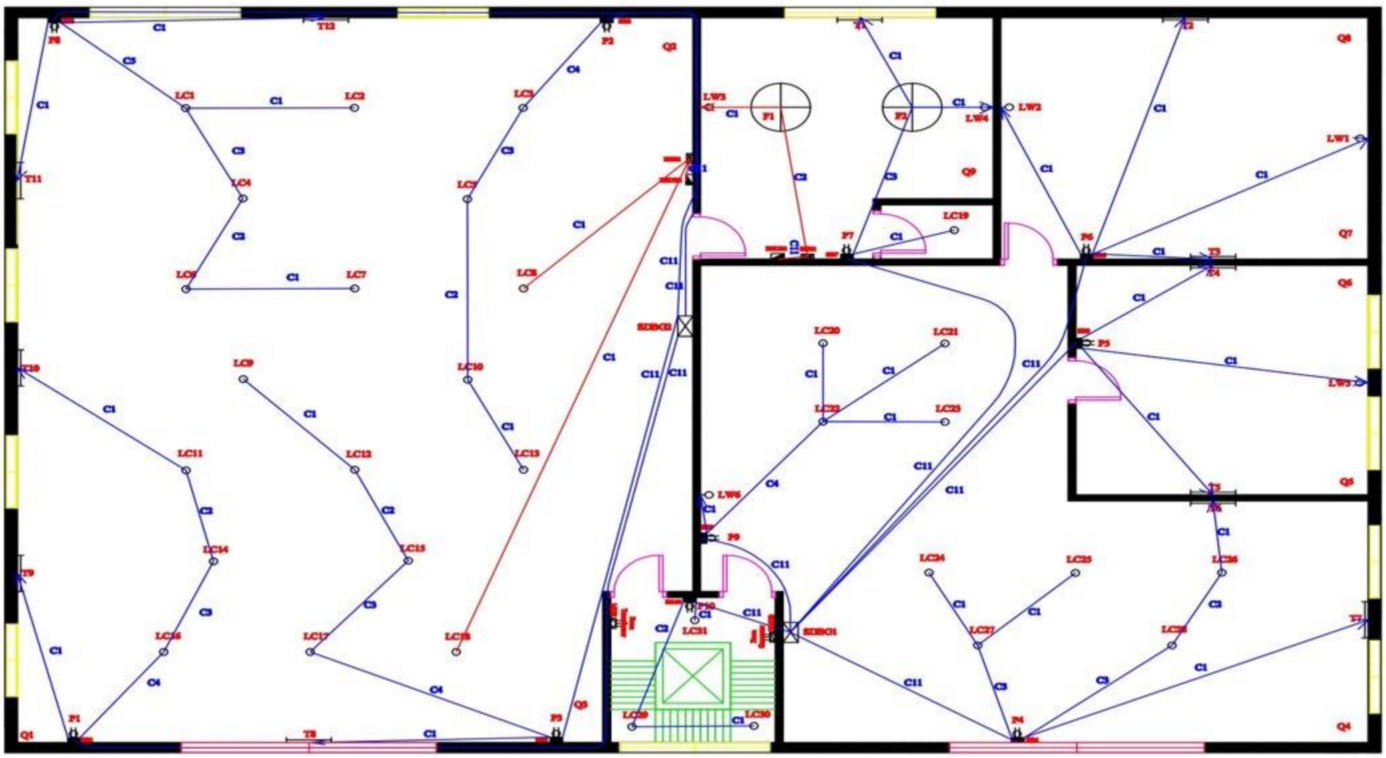
Fitting and Fixtures Layout (Typical Floor)



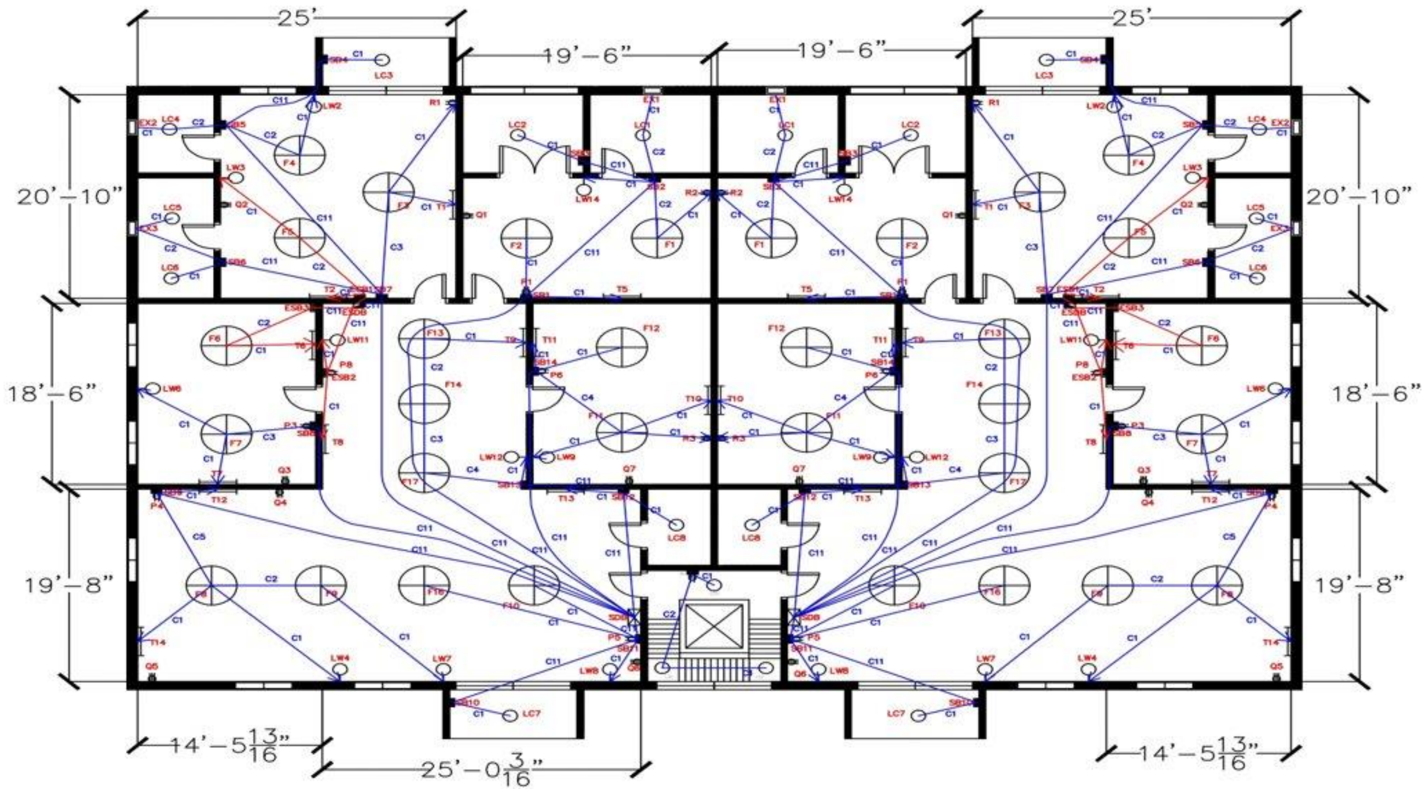
Schedule of Conduit

Notation	Notation Description	Conduit Size
C1	2×1.5 rm BYM	¾"
C2	4×1.5 rm BYM	¾"
C3	6×1.5 rm BYM	¾"
C4	8×1.5 rm BYM	1"
C5	10×1.5 rm BYM	1"
C11	2×1.5 rm BYM + 1.5 rm BYA ECC	¾"

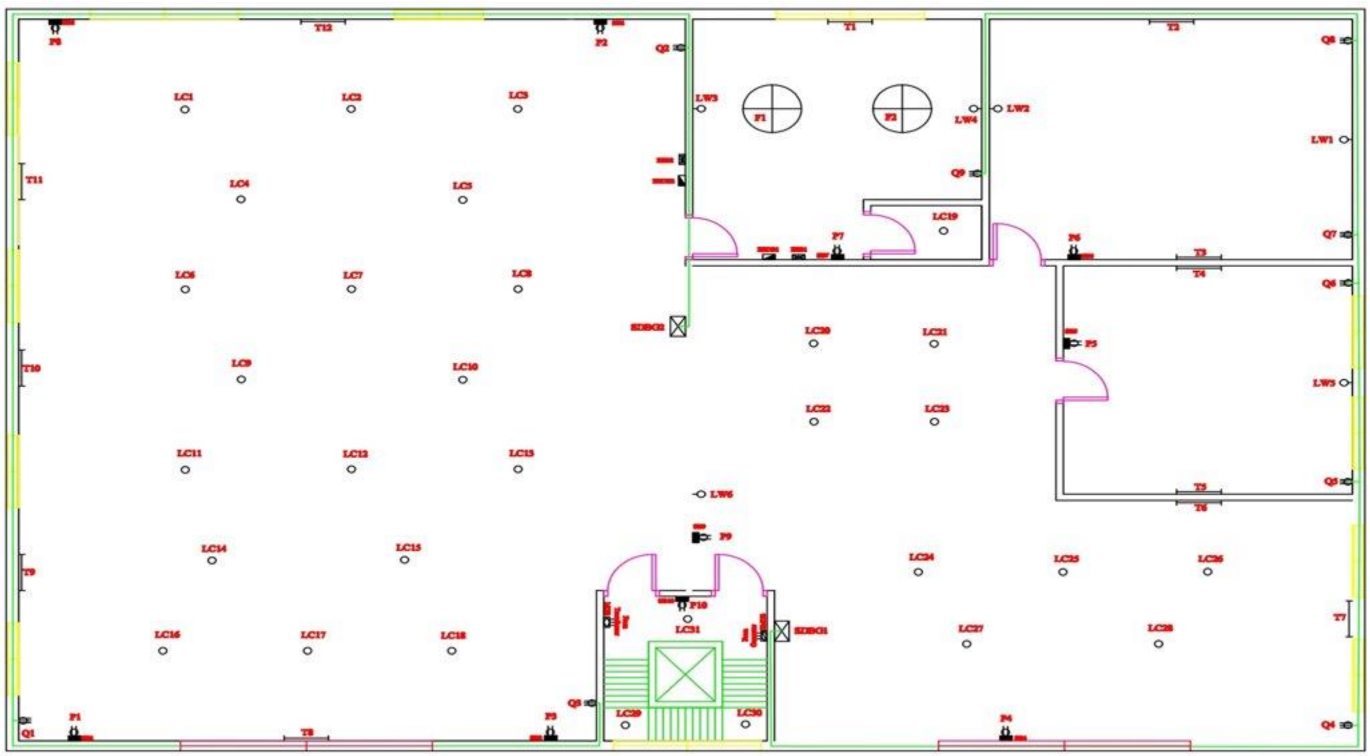
Conduit Layout (Ground Floor)



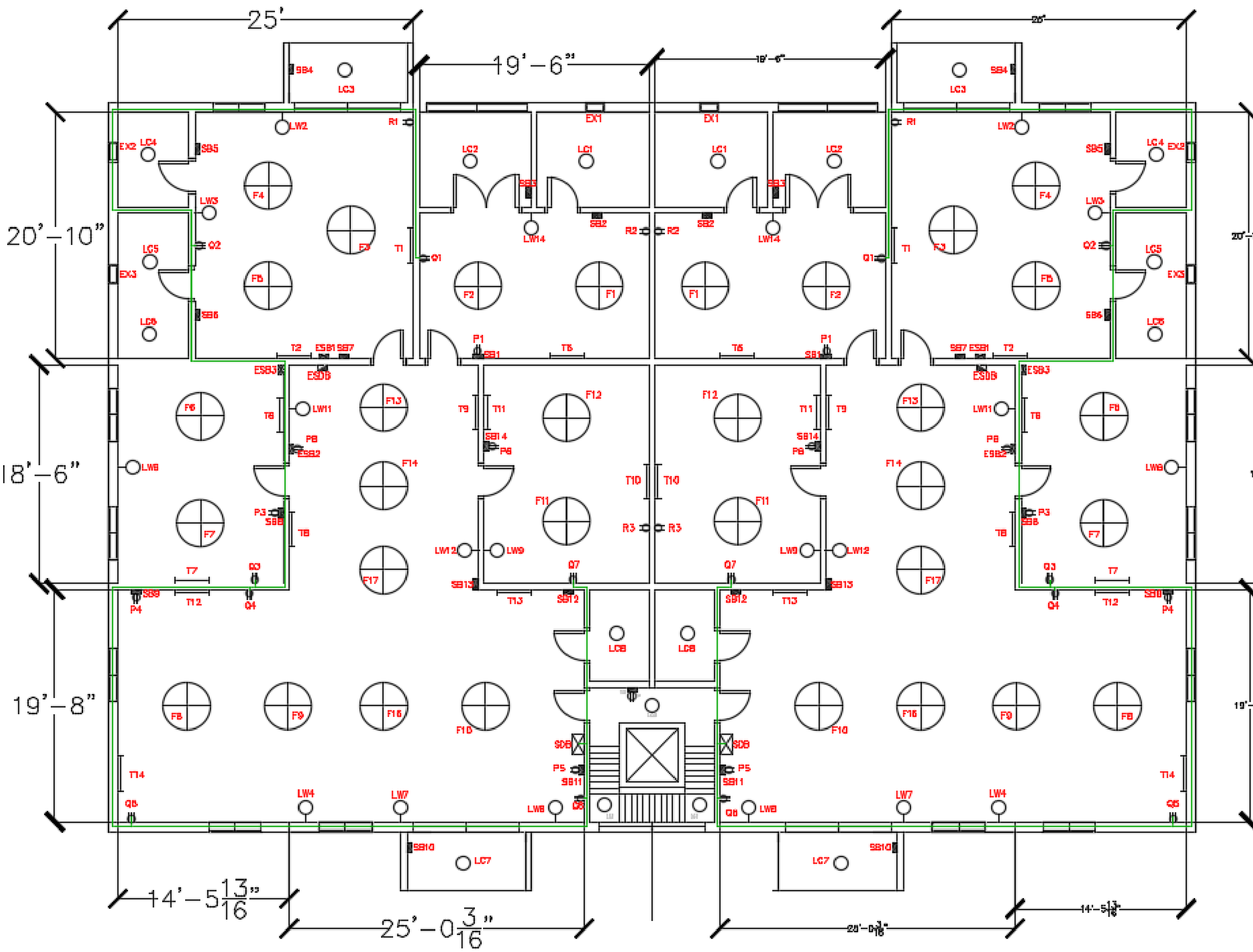
Conduit Layout (Typical Floor)



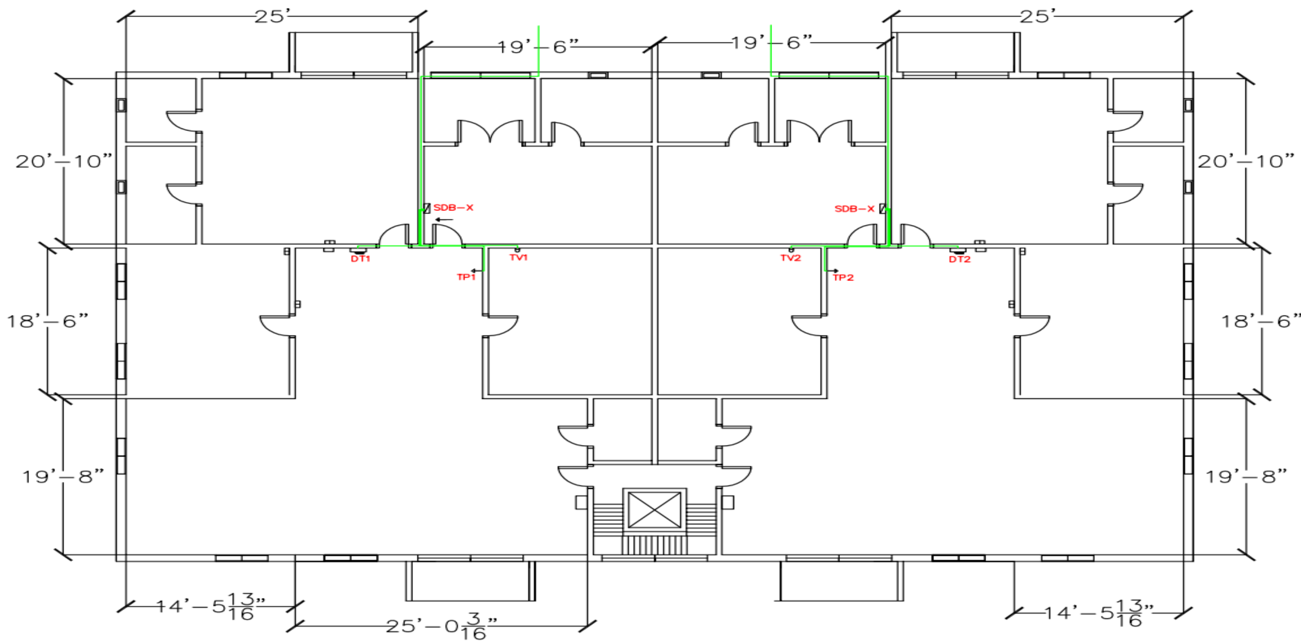
Power Socket Layout (Ground Floor)



Power Socket Layout (Typical Floor)

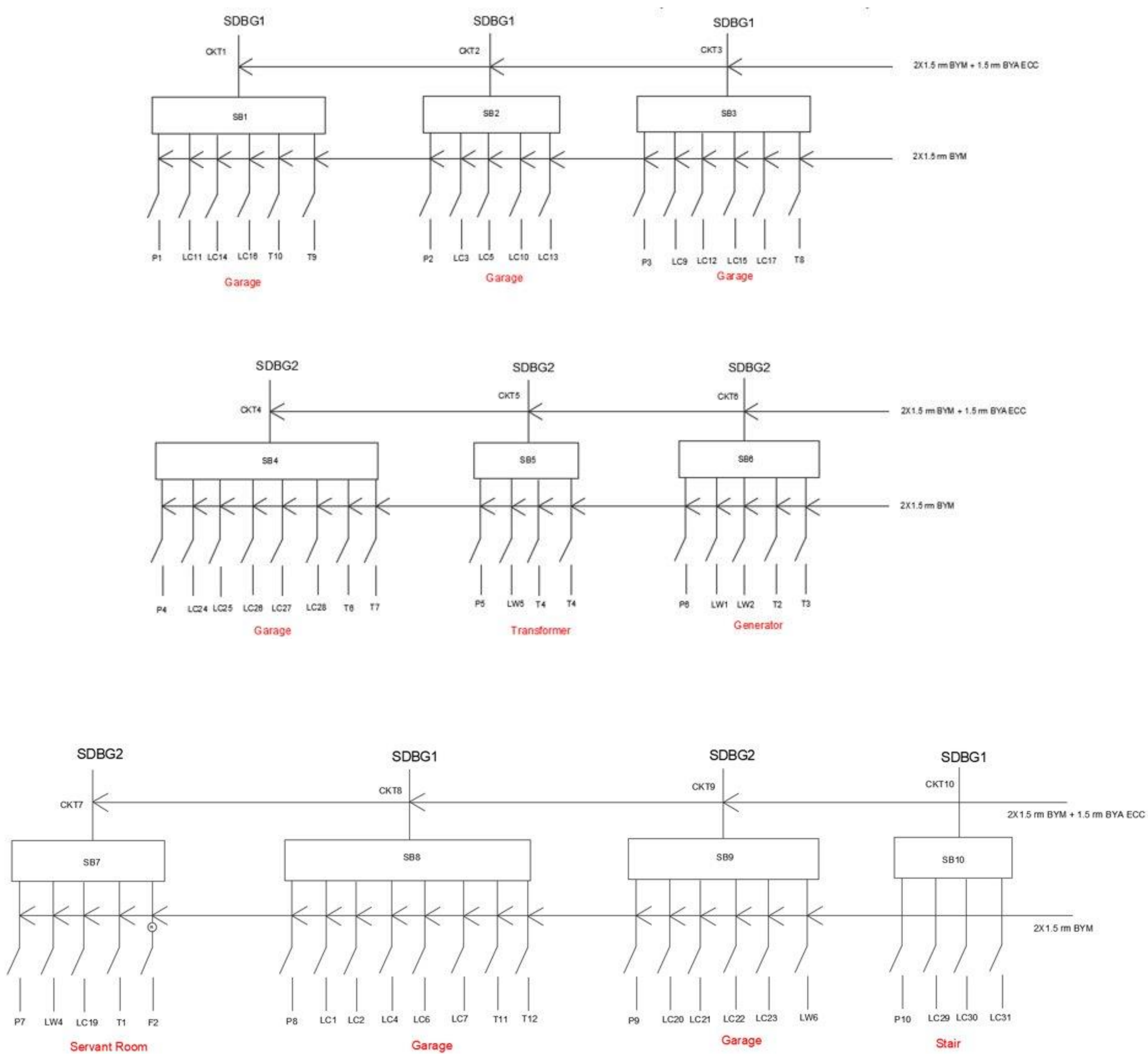


Conduit of TV, Telephone and Data Network



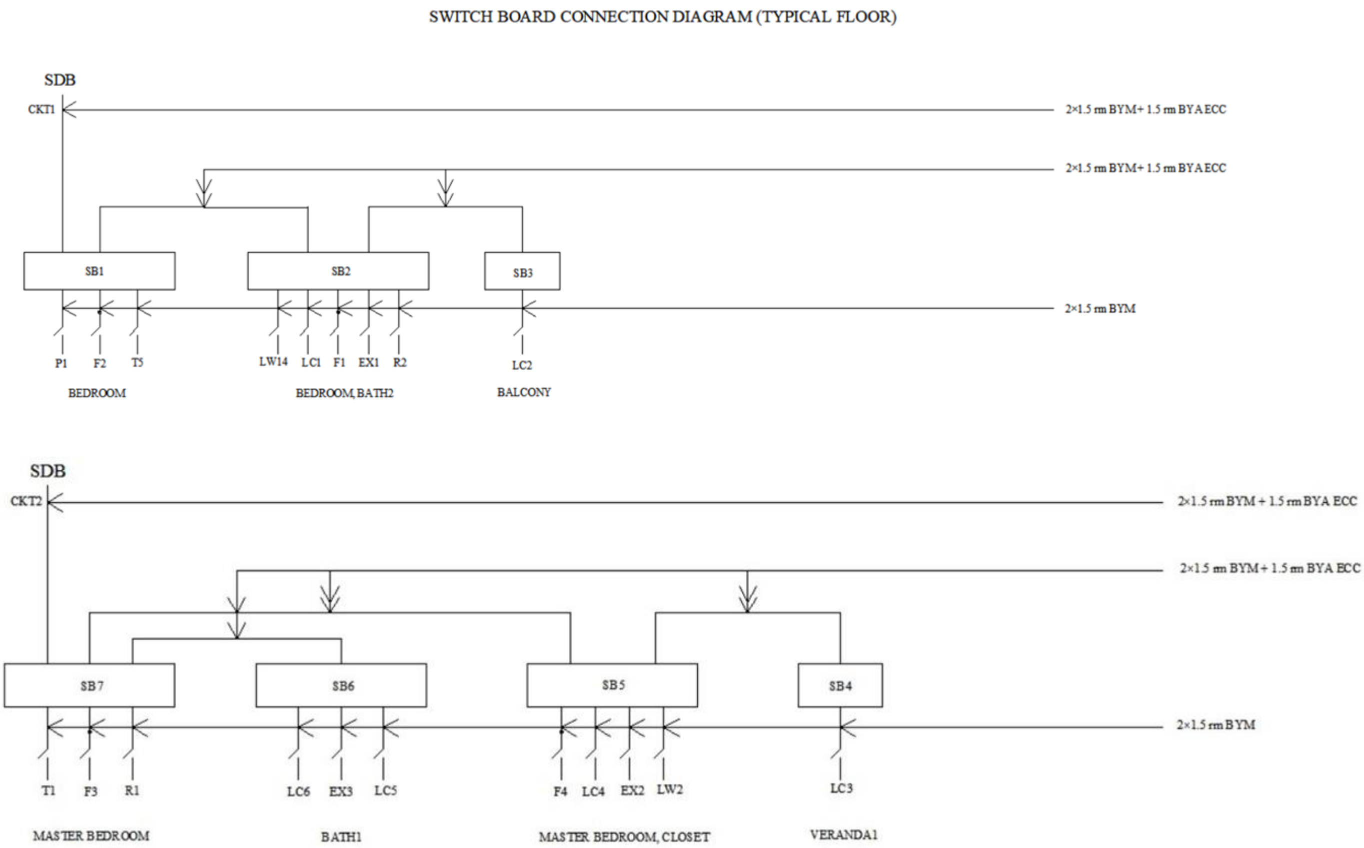
Switch Board Connection Diagram-

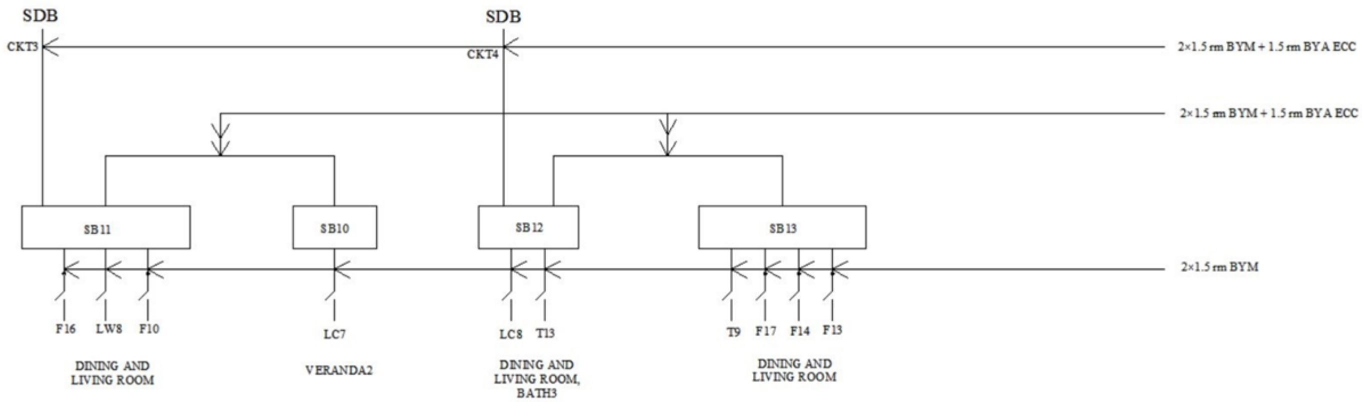
Ground Floor

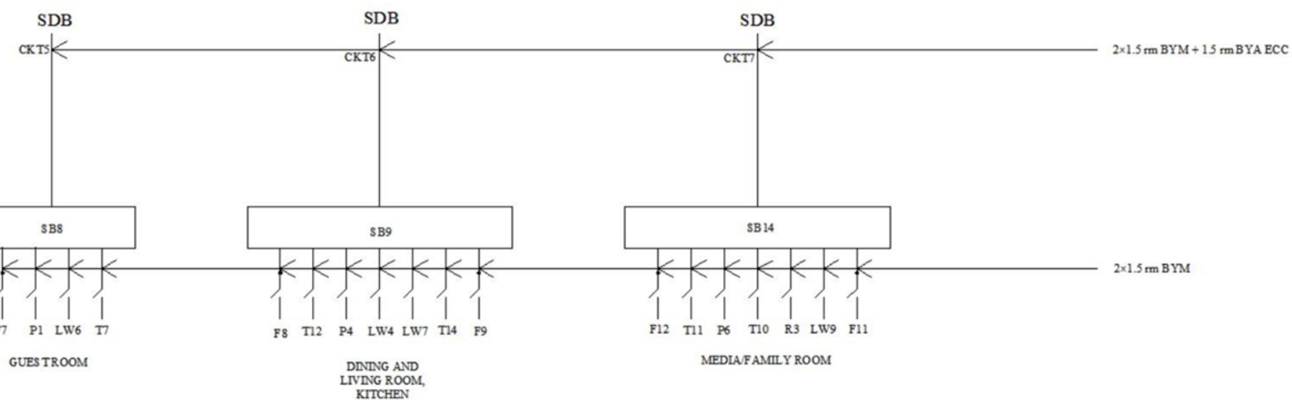


Switch Board Connection Diagram-

Typical Floor

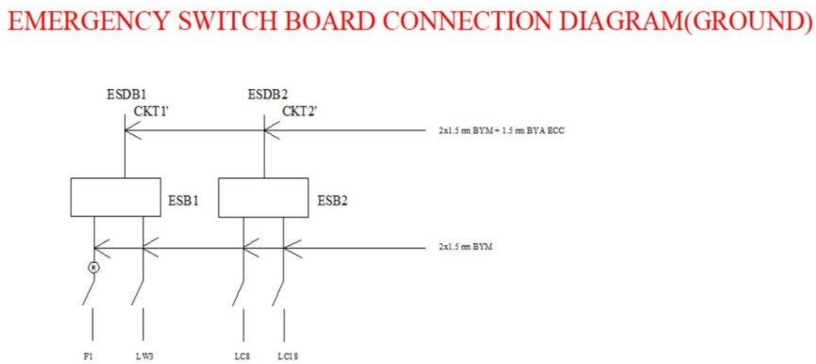



SDB
CKT3
SDB
CKT4
2×1.5 mm BYM + 1.5 mm BYA ECC
2×1.5 mm BYM + 1.5 mm BYA ECC
SB11
SB10
SB12
SB13
2×1.5 mm BYM
F16
LW8
F10
LC7
LC8
T13
T9
F17
F14
F13
DINING AND
LIVING ROOM
VERANDA2
DINING AND
LIVING ROOM,
BATH3
DINING AND
LIVING ROOM

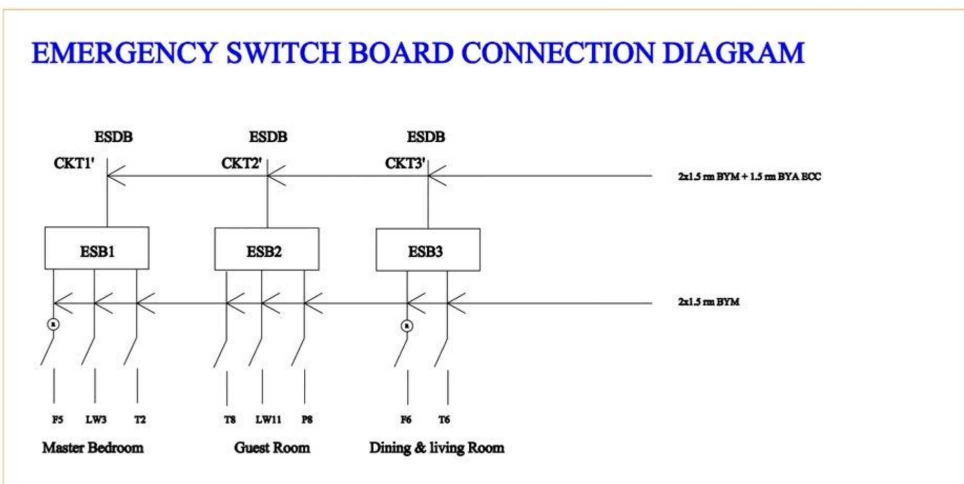

SDB
CKT5
SDB
CKT6
SDB
CKT7
2×1.5 mm BYM + 1.5 mm BYA ECC
SB8
SB9
SB14
2×1.5 mm BYM
F7
P1
LW6
T7
F8
T12
P4
LW4
LW7
T14
F9
F12
T11
P6
T10
R3
LW9
F11
GUESTROOM
DINING AND
LIVING ROOM,
KITCHEN
MEDIA/FAMILY ROOM

<u>Emergency Switchboard Connection Diagram</u>

Ground Floor

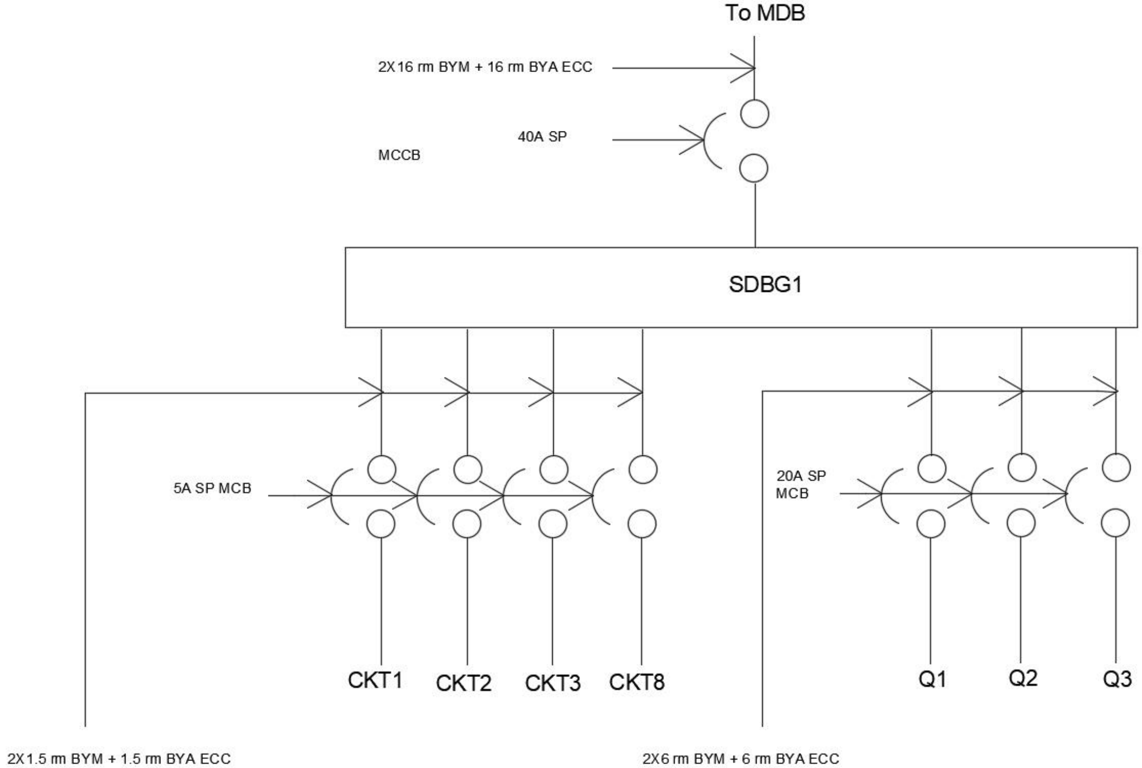


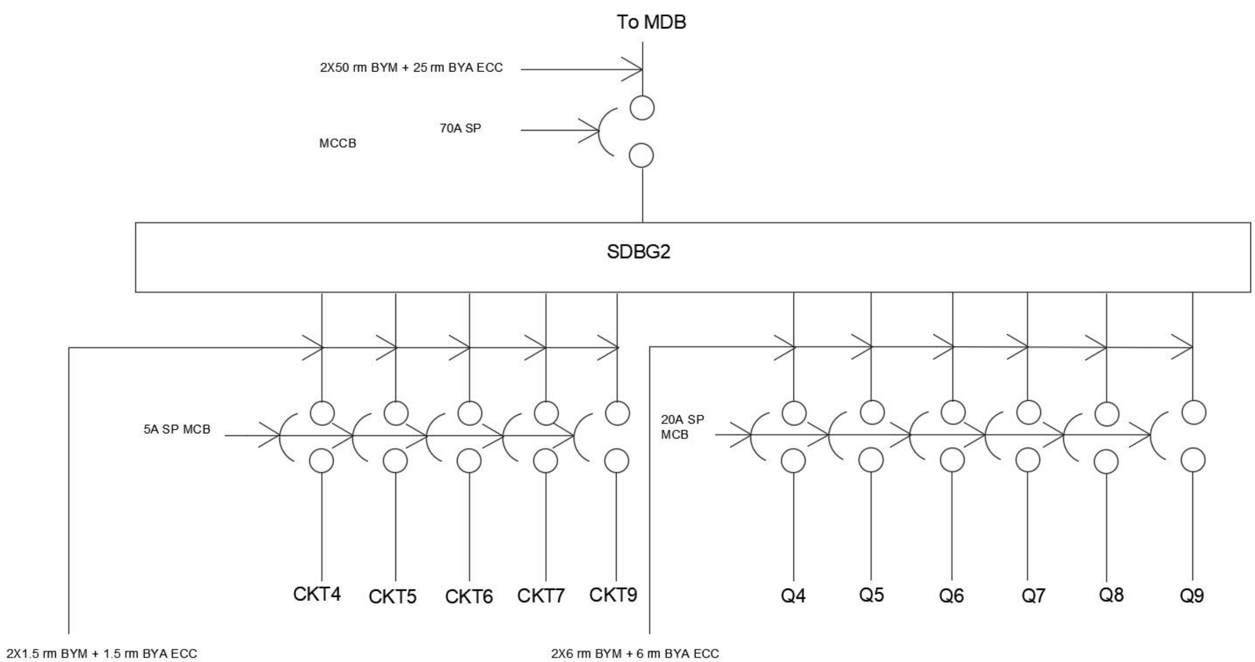
Typical Floor



Sub Distribution Board (SDB) Diagram-

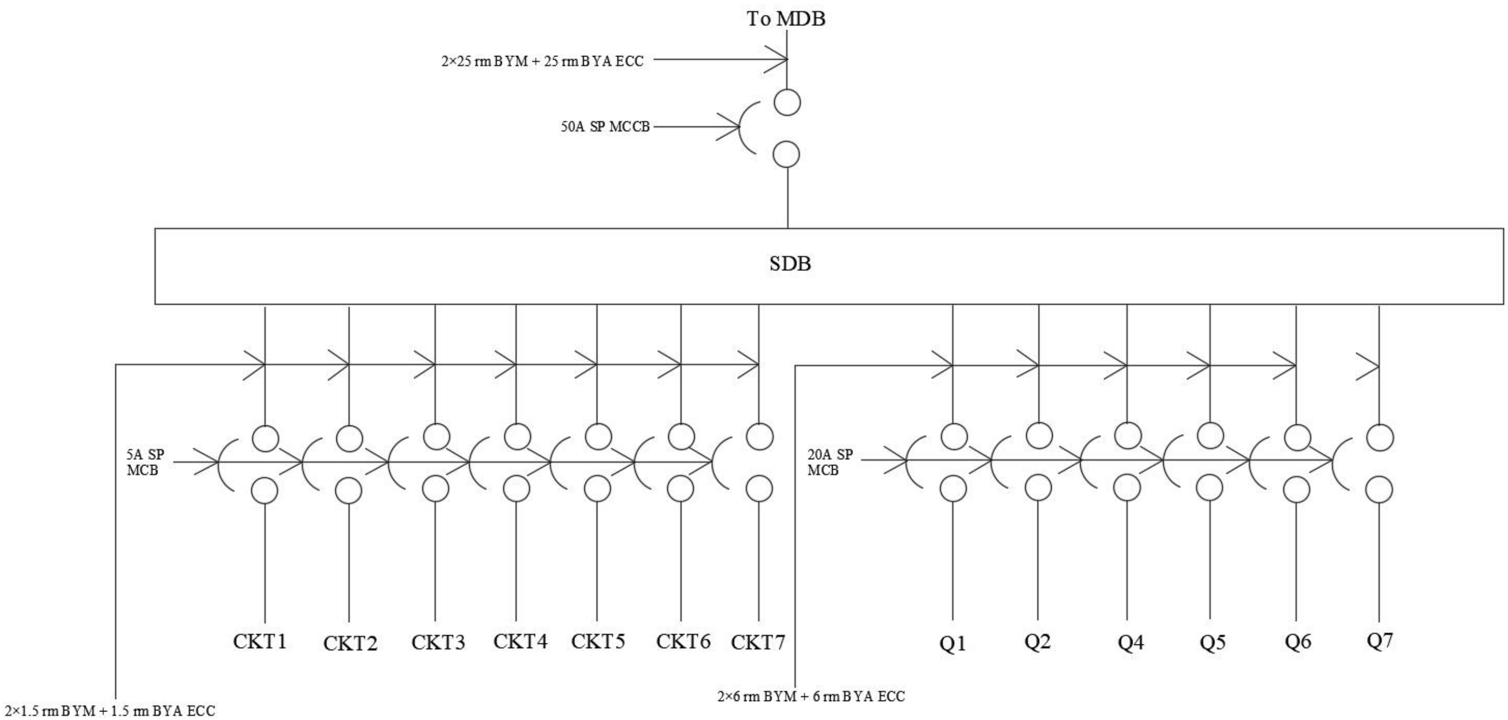
Ground Floor



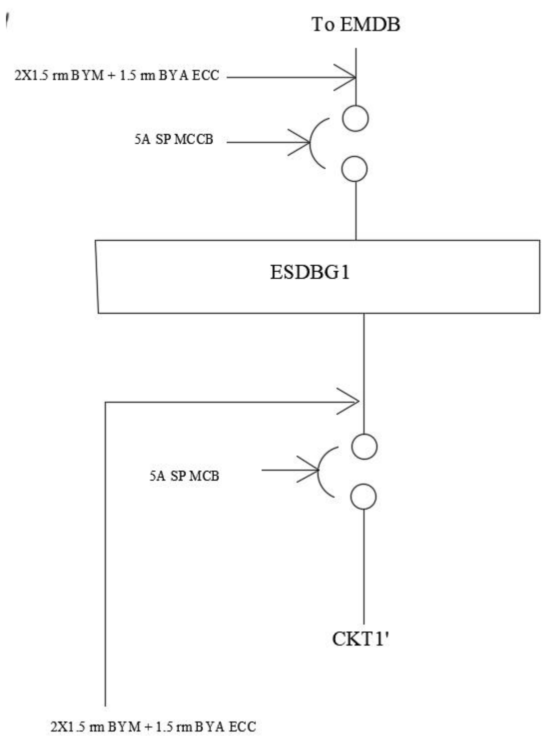


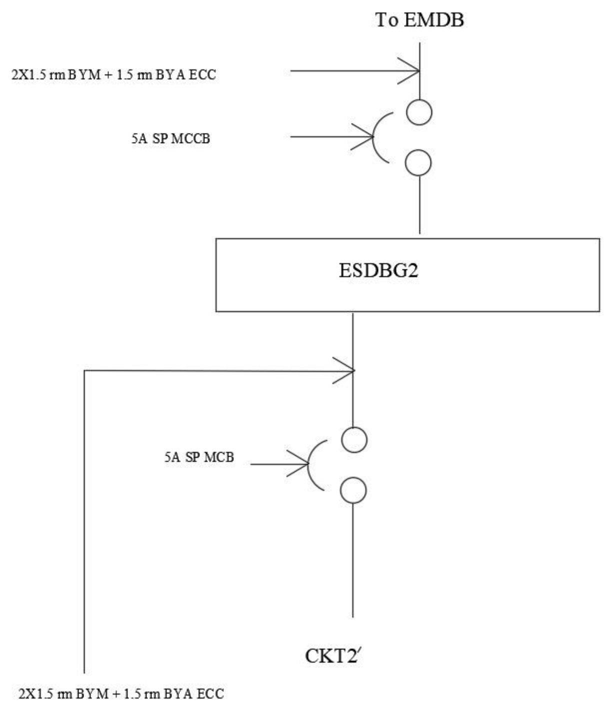
<u>Sub Distribution Board (SDB) Diagram-</u>

Typical Floor

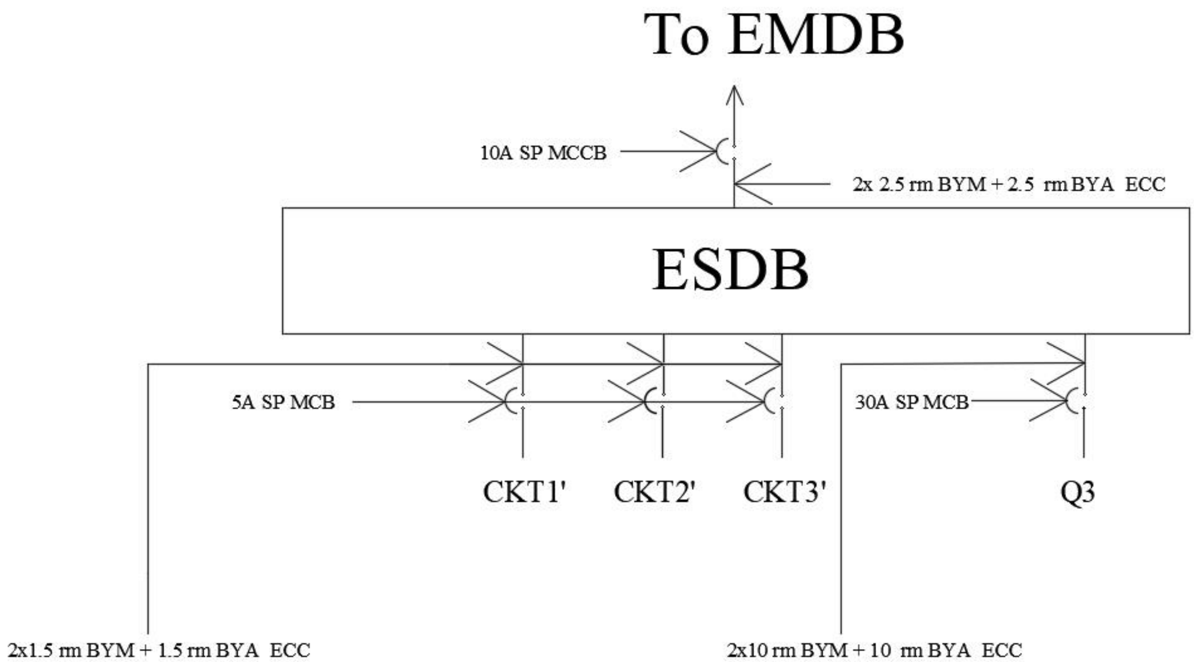


Emergency Sub Distribution Board Diagram – Ground Floor

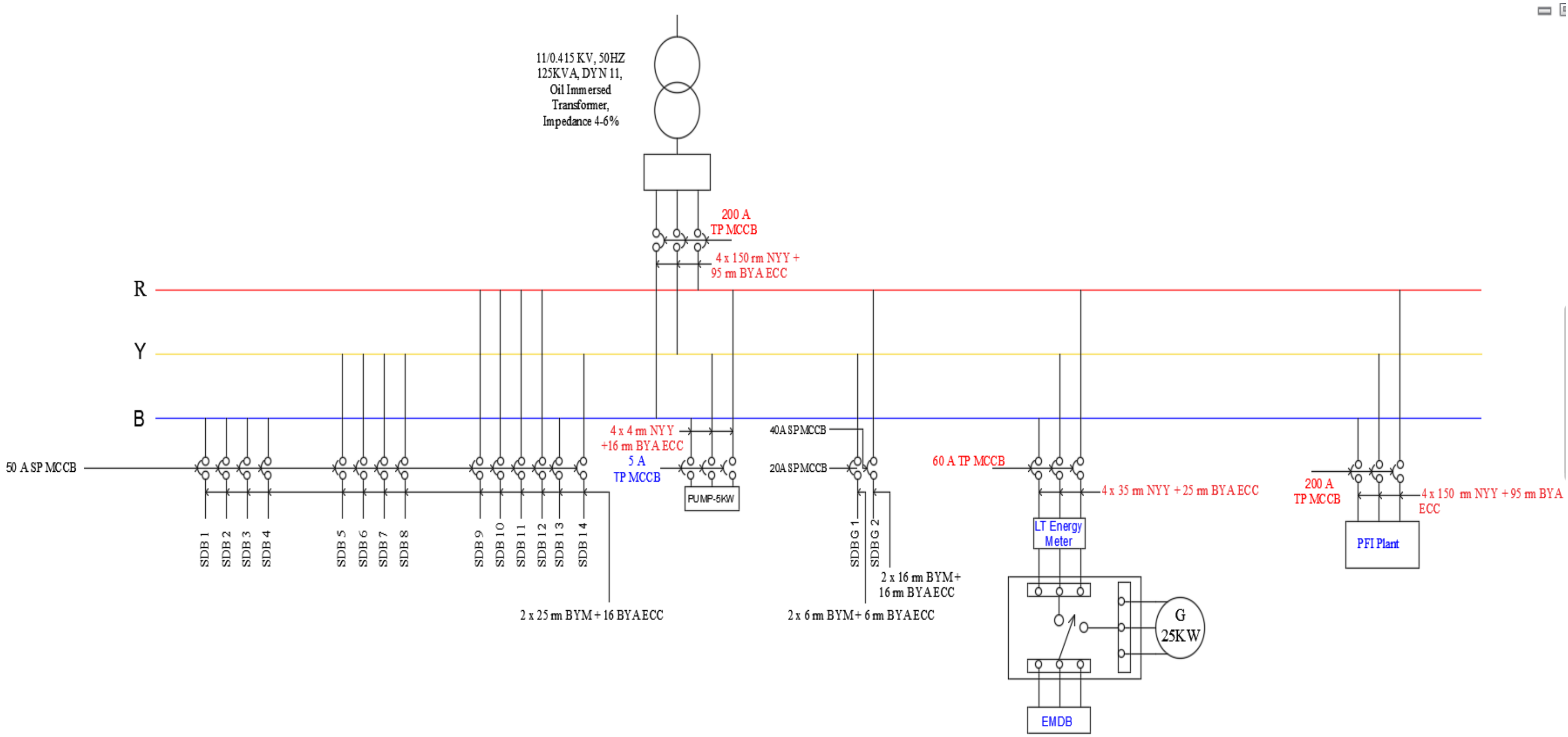




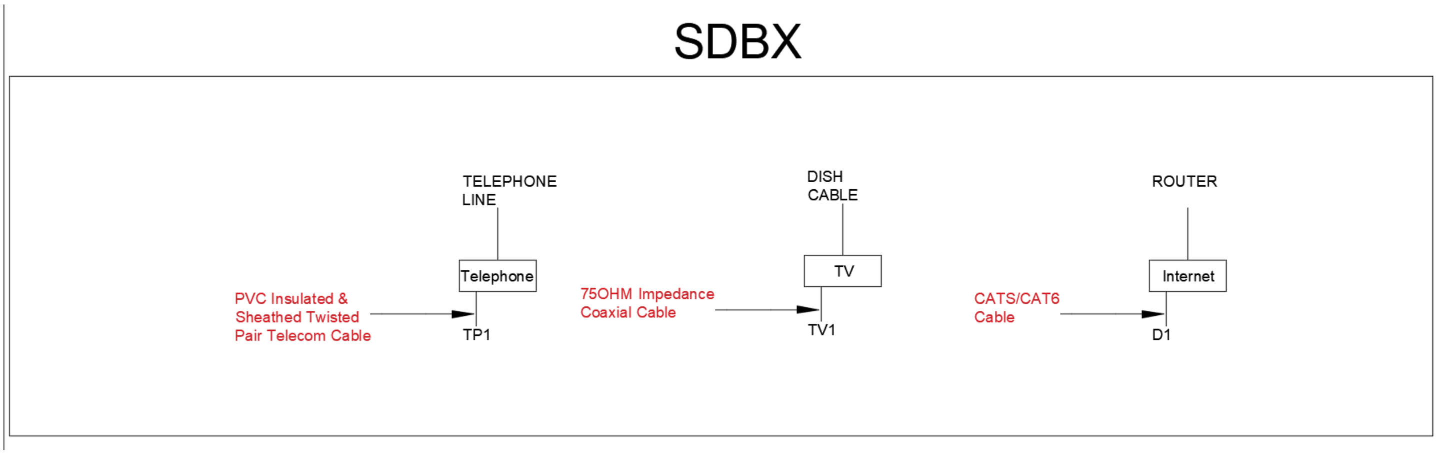
Typical Floor



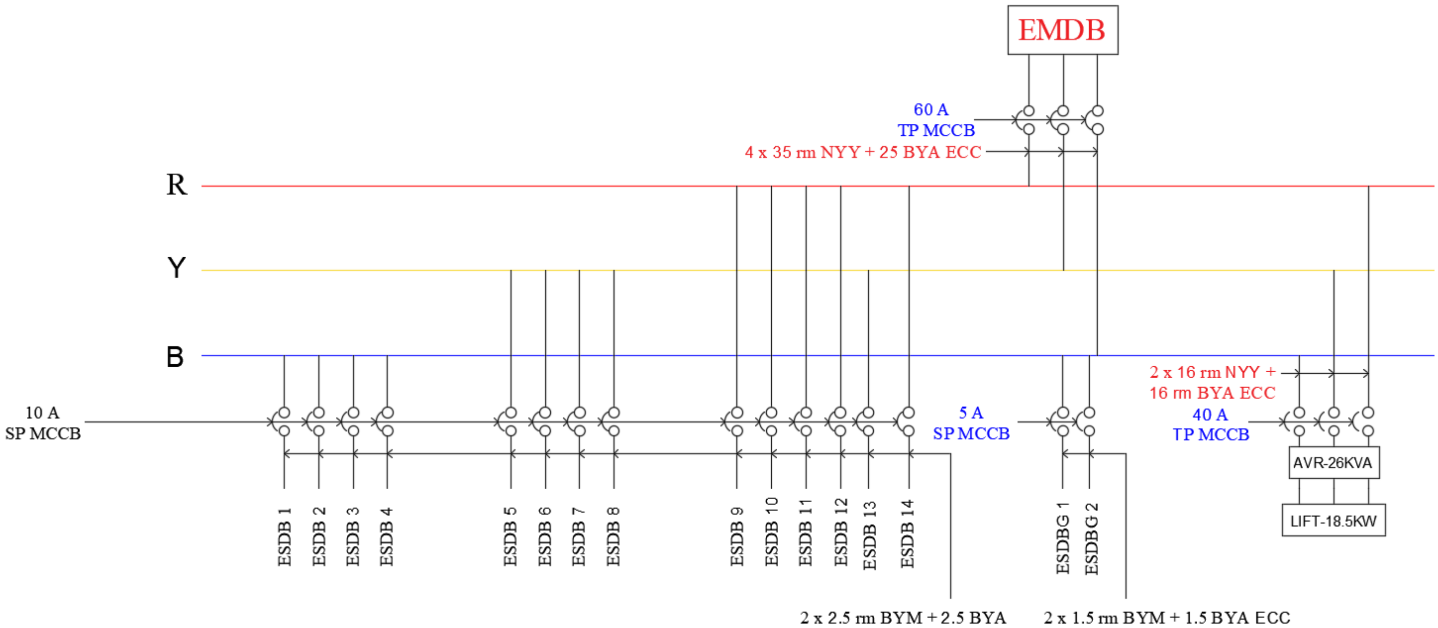
Main Distribution Board Diagram



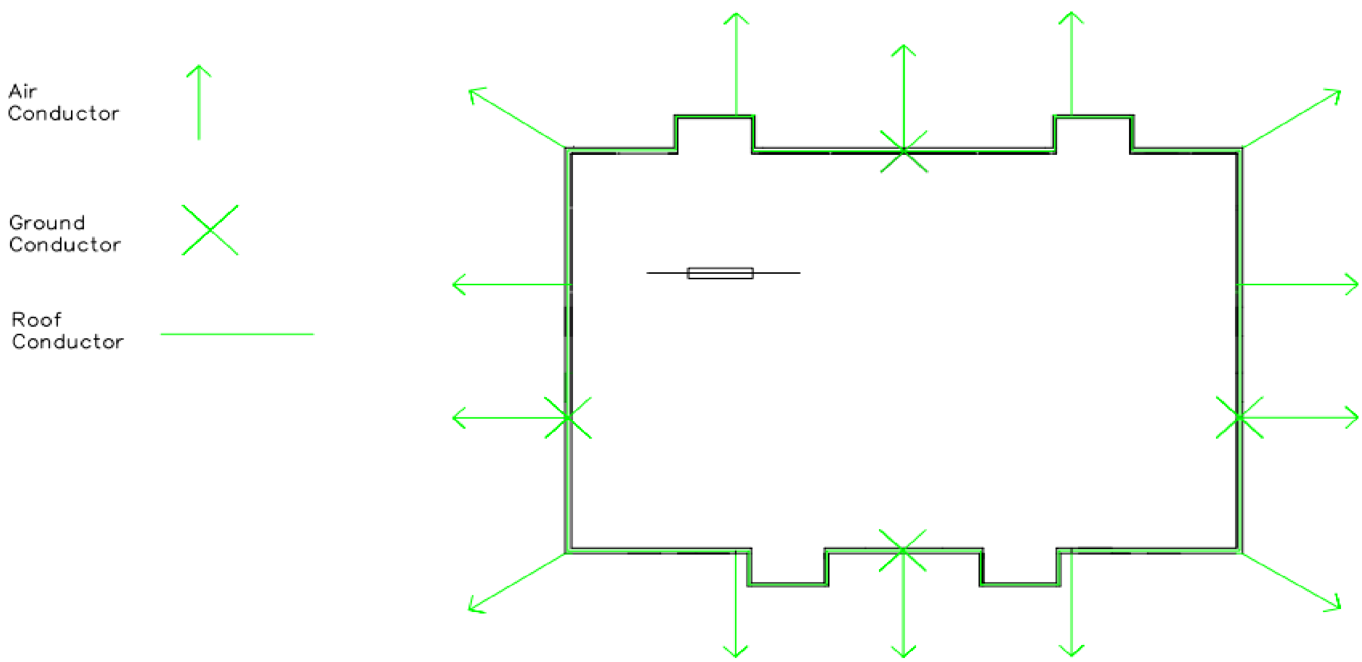
Sub Distribution board for Dish TV, Data Connection and Telephone Connection:



Emergency Main Distribution Board Diagram



LPS design:



Calculations for Light Bulbs and Fans:

We know, the formula for illuminance in a room is,

$$Illuminance,\ \mathrm{E} = \frac{N.n.F.UF.LLF}{A}$$

Where, n = number of light bulbs / illuminances

N = number of light bulbs needed in the room

A = Area of the room in square meters

UF = Utilization factor

LLF = Light loss factor

F = lumen rating of the bulb in flux

From the above formula of illuminance, we are to determine the number of light bulbs needed per room in our design. Thus, the formula for the number of light bulbs can be written as,

$$Number\ of\ light\ bulbs\ required,\ N = \frac{E.A}{n.F.UF.LLF}$$

For our calculations, we assume the following,

Illuminance, E = 100 lux

Number of illuminances, n = 1

Utilization factor, UF = 0.74

Light loss factor, LLF = 0.73

For the light bulbs, we choose WALTON LED light bulbs for home. From their verified product page, we find the specifications for the bulb of the “Public Series” to be as follows:

Input Power:	20W
Luminous:	2000 Lumen
Power Efficiency:	100Lm/Watt
Color Temp:	6500K
Product Dimension:	Diameter- 70mm
LED Type:	Bulb
Model:	WLED-PS-20WE27(20 Watt)

We use bulbs of input power 20W for our calculations. Combined with the power efficiency of 100Lm/watt, we calculate the lumen rating of the bulbs to be,

Lumen rating,F = 100 * (Lm/W) * 20 W = 2000 Lm

Now, for the calculation of the number of fans required to be installed per room, for the weather conditions of Bangladesh, one 56” span ceiling fan is required for each 100 sq.ft. of area of room. Therefore, the number of fans required,

$$N_{fan} = \frac{A}{150\ sq.\ ft.}$$

Unless the number of fans required is calculated to be very close to the upper ceiling of the floating-point results, the lower floor value is used as gentle breeze is considered to reach the far corners.

Now, we calculate the number of bulbs and fans required in each room of our floor plans.

- **Master bedroom 1:**

  Dimensions: 18’6" * 20’10”

  Area = 18’6" *20’10” = 385.42sq. ft = 35.8064sq.m

$$N = \frac{E.A}{n.F.UF.LLF} = \frac{100*35.8064}{1*2000*.74*.73} = 3.31 \approx 4$$

$$N_{\text{fan}} = \frac{A}{150\ sq,ft} = 2.569 \approx 3$$

So, Number of required light bulbs = 4
Number of required fans = 3

- **Master bedroom 2:**
Dimensions: 18’6" * 20’10”
Area = 18’6" * 20’10” = 385.42 sq. ft = 35.8064 sq.m

$$N = \frac{E.A}{n.F.UF.LLF} = \frac{100*35.8064}{1*2000*.74*.73} = 3.31 \approx 4$$

$$N_{\text{fan}} = \frac{A}{150\ sq,ft} = 2.569 \approx 3$$

So, Number of required light bulbs = 4
Number of required fans = 3

- **Bedroom 1:**
Dimensions: 19’6” * 12’4”
Area = 19’6” * 12’4” =240.5 sq. ft = 22.34 sq.m

$$N = \frac{E.A}{n.F.UF.LLF} = \frac{100*22.34}{1*2000*.74*.73} = 2.068 \approx 2$$

$$N_{\text{fan}} = \frac{A}{150\ sq,ft} = 1.603 \approx 2$$

So, Number of required light bulbs = 2
Number of required fans = 2

- **Bedroom 2:**
Dimensions: 19’6”*12’4”

Area =19’6”*12’4” =240.5sq. ft= 22.34sq.m

$$N= \frac{E.A}{n.F.UF.LLF}=\frac{100*22.34}{1*2000*.74*.73}=2.068\approx 2$$

$$N_{\text{fan}}=\frac{A}{150\ sq,ft}=1.603\approx 2$$

So, Number of required light bulbs = 2
Number of required fans = 2

- **Guest room 1:**

Dimensions: 18’6” * 13’(189/16)”

Area =18’6”*13’(189/16)” =258.71sq. ft=24.02sq.m

$$N= \frac{E.A}{n.F.UF.LLF}=\frac{100*24.02}{1*2000*.74*.73}=2.22\approx 3$$

$$N_{\text{fan}}=\frac{258.71}{150\ sq,ft}=1.72\approx 2$$

So, Number of required light bulbs = 3
Number of required fans = 2

- **Guest room 2:**

Dimensions: 18’6”*13’(189/16)”

Area = 18’6”*13’(189/16)”=258.71sq. ft = 24.02sq.m

$$N= \frac{E.A}{n.F.UF.LLF}=\frac{100*24.02}{1*2000*.74*.73}=2.22\approx 3$$

$$N_{\text{fan}}=\frac{258.71}{150\ sq,ft}=1.72\approx 2$$

So, Number of required light bulbs = 3
Number of required fans = 2

- **Dining room and kitchen 1:**

Dimensions: 39’6” * 19’8” +16’3/8” *18’6”

Area = 39’6” * 19’8” +16’3/8” *18’6”=(776.833+296.578) sq. ft
=1073.411 sq.ft =99.66 sq.m

$$N= \frac{E.A}{n.F.UF.LLF}=\frac{100*99.66}{1*2000*.74*.73}=9.22\approx10$$

$$N_{\text{fan}}=\frac{1073.411}{150\ sq,ft}=7.156\approx7$$

So, Number of required light bulbs = 10
Number of required fans = 7

- **Dining room and kitchen 2:**

Dimensions: 39’6” * 19’8” +16’3/8” *18’6”
Area = 39’6” * 19’8” +16’3/8” *18’6” =(776.833+296.578) sq. ft =1073.411 sq.ft =99.66 sq.m

$$N= \frac{E.A}{n.F.UF.LLF}=\frac{100*99.66}{1*2000*.74*.73}=9.22\approx10$$

$$N_{\text{fan}}=\frac{1073.411}{150\ sq,ft}=7.156\approx7$$

So, Number of required light bulbs = 10
Number of required fans = 7

- **Media room 1:**

Dimensions: 18’6” * 13’11$\frac{13}{16}$”
Area = 18’6” * 13’11$\frac{13}{16}$” =258.71 sq. ft = 24.02 sq.m

$$N= \frac{E.A}{n.F.UF.LLF}=\frac{100*24.02}{1*2000*.74*.73}=2.22\approx3$$

$$N_{\text{fan}}=\frac{258.71}{150\ sq,ft}=1.72\approx2$$

So, Number of required light bulbs = 3

Number of required fans = 2

- Media **room 2:**

Dimensions: 18’6” * 13’11$\frac{13}{16}$”

Area = 18’6” * 13’11$\frac{13}{16}$” =258.71 sq. ft = 24.02 sq.m

$$N= \frac{E.A}{n.F.UF.LLF}=\frac{100*24.02}{1*2000*.74*.73}=2.22\approx 3$$

$$N_{\text{fan}}=\frac{258.71}{150\ sq,ft}=1.72\approx 2$$

So, Number of required light bulbs = 3

Number of required fans = 2

Calculation for SB Conduits:

Formula for ampere rating, $I = \frac{P}{V*pf}(A)$

All Lights: 20 W, Ceiling Fan: 100 W, Exhaust Fan: 40 W, V = 220 V

Switchboard Sockets: 100 W, 3-pin Sockets: 20 A, 4000 W, pf = 0.7

Typical Floor Switch Board

CKT1 Rating

$$I = \frac{100*2+100*2+40+20*4}{220*0.7} A = 3.377 A$$

So, 2×1.5 rm BYM + 1.5 BYA are used.

CKT2 Rating

$$I = \frac{100*2+40*2+100+20*6}{220*0.7} A = 3.247 A$$

So, 2×1.5 rm BYM + 1.5 BYA are used.

CKT3 Rating

$$I = \frac{100*2+20*2}{220*0.7} A = 1.558 A$$

So, 2×1.5 rm BYM + 1.5 BYA are used.

CKT4 Rating

$$I = \frac{100*3+20*3}{220*0.7} A = 2.338 A$$

So, 2×1.5 rm BYM + 1.5 BYA are used.

CKT5 Rating

$$I = \frac{100*2+20*2}{220*0.7} A = 1.558 A$$

So, 2×1.5 rm BYM + 1.5 BYA are used.

CKT6 Rating

$$I = \frac{100*2+100+20*4}{220*0.7} A = 2.467 A$$

So, 2×1.5 rm BYM + 1.5 BYA are used.

CKT7 Rating

$$I = \frac{100*2+100*2+20*3}{220*0.7} A = 2.987 A$$

So, 2×1.5 rm BYM + 1.5 BYA are used.

Ground Floor Conduit
Switch Board
CKT_GND1 Rating
$$I = \frac{100 + 20 * 5}{220 * 0.7}\ A = 1.3A$$
So, 2×1.5 rm BYM + 1.5 BYA are used.
CKT_GND2 Rating
$$I = \frac{100 + 20 * 4}{220 * 0.7}\ A = 1.17A$$
So, 2×1.5 rm BYM + 1.5 BYA are used.
CKT_GND3 Rating
$$I = \frac{100 + 20 * 5}{220 * 0.7}\ A = 1.3A$$
So, 2×1.5 rm BYM + 1.5 BYA are used.
CKT_GND4 Rating
$$I = \frac{100 + 20 * 7}{220 * 0.7}\ A = 1.56A$$
So, 2×1.5 rm BYM + 1.5 BYA are used.
CKT_GND5 Rating
$$I = \frac{100 + 20 * 3}{220 * 0.7}\ A = 1.04A$$
So, 2×1.5 rm BYM + 1.5 BYA are used.
CKT_GND6 Rating
$$I = \frac{100 + 20 * 4}{220 * 0.7}\ A = 1.17A$$
So, 2×1.5 rm BYM + 1.5 BYA are used.

CKT_GND7 Rating
$$I = \frac{100 + 20 * 3 + 100}{220 * 0.7}\ A = 1.7A$$
So, 2×1.5 rm BYM + 1.5 BYA are used.
CKT_GND8 Rating
$$I = \frac{100 + 20 * 7}{220 * 0.7}\ A = 1.56A$$
So, 2×1.5 rm BYM + 1.5 BYA are used.
CKT_GND9 Rating
$$I = \frac{100 + 20 * 5}{220 * 0.7}\ A = 1.3A$$
So, 2×1.5 rm BYM + 1.5 BYA are used.
CKT_GND10 Rating
$$I = \frac{100 + 20 * 3}{220 * 0.7}\ A = 1.04A$$
So, 2×1.5 rm BYM + 1.5 BYA are used.

Emergency Switch Board:
Typical Floor

CKT1 Rating

$$I = \frac{100 + 20 * 2}{220 * 0.7}\ A = 0.909A$$

So, 2×1.5 rm BYM + 1.5 BYA are used.

CKT2 Rating

$$I = \frac{100 + 20 * 2}{220 * 0.7}\ A = 0.909A$$

So, 2×1.5 rm BYM + 1.5 BYA are used.

CKT3 Rating

$$I = \frac{100 + 20}{220 * 0.7}\ A = 0.779A$$

So, 2×1.5 rm BYM + 1.5 BYA are used.

Emergency Switch Board Ground floor:

For ESDBG1,

CKT1' à

$$I = \frac{100 * 1 + 20 * 1}{220 * 0.7}\ A = 0.779A$$

So, 2×1.5 rm BYM + 1.5 BYA ECC are used.

For ESDBG2,

CKT2' à

$$I = \frac{20 * 2}{220 * 0.7}\ A = 0.259A$$

So, 2×1.5 rm BYM + 1.5 BYA ECC are used.

Calculation for SDB:
Typical Floor

Total SDB Load = Total load from CKTs × 0.7 + Total Power Socket Load × 0.4

Total load from CKTs = CKT1 Load + CKT2 Load + CKT3 Load + CKT4 Load + CKT5 Load
+ CKT6 Load + CKT7 Load

SDB Current = $\frac{Total\ ESDB\ Load}{Voltage \times pf}$, Power Socket Load = 4000 W

Voltage = 220 V, Power Factor = 0.7

CKT1 Load = $100 * 2 + 100 * 2 + 40 + 20 * 4$ = 520 W
CKT2 Load = $100 * 2 + 40 * 2 + 100 + 20 * 6$ = 500 W
CKT3 Load = $100 * 2 + 20 * 2$ = 240 W
CKT4 Load = $100 * 3 + 20 * 3$ = 360 W
CKT5 Load = $100 * 2 + 20 * 2$ = 240 W
CKT6 Load = $100 * 2 + 100 + 20 * 4$ = 380 W
CKT7 Load = $100 * 2 + 100 * 2 + 20 * 3$ = 460 W

Total load from CKTs = 2700 W
Total Load From Power Socket = 4000 W * 6 = 24000 W

SDB Load = 2700 * 0.7 + 24000 * 0.2 = 6690 W
SDB Current = $\frac{6690}{220\times0.7} = 43.442\ A$

So, 50 A SP MCCB is needed from SDB to MDB and 2 × 25 rm BYM + 25 BYA are used.

Calculation for SDB Ground Floor :

SDBG1
SDB Load = Total Load * 0.7 + Total Q Socket Load * 0.2
Total Load = ∑CKT_GND Load
SDB Current = $\frac{SDB\ Load}{Voltage * pf}$
Q Load = 4000 W
Total Load = 200 + 180 + 200 + 140 + 160 = 980 W
SDB Load = 980*0.7 + 4000*3*0.2 = 3086 W
Current = $\frac{3086}{220*0.7} = 20\ A$
So, 20A SP MCCB is needed from SDBG1 to MDB and 2*6 rm BYM + 6 rm BYA ECC are used.
SDBG2
SDB Load = Total Load * 0.7 + Total Q Socket Load * 0.2
Total Load = ∑CKT_GND Load
SDB Current = $\frac{SDB\ Load}{Voltage * pf}$
Q Load = 4000 W
Total Load = 240 + 160 + 180 + 260 + 200 = 1040 W
SDB Load = 1040*0.7 + 4000*6*0.2 = 5528 W
Current = $\frac{5528}{220*0.7} = 35.9\ A$
So, 40A SP MCCB is needed from SDBG2 to MDB and 2*16 rm BYM + 16 rm BYA ECC are used.

Calculation for ESDB:

Typical Floor

Total ESDB Load = Total load from CKTs x 0.7 + Total Power Socket Load x 0.2

Total load from CKTs = CKT1’ Load + CKT2’ Load + CKT3’ Load

ESDB Current = $\frac{Total\ ESDB\ Load}{Voltage\ \times pf}$

Power Socket Load = 4000W

Voltage = 220V

Power Factor = 0.7

CKT1’ Load = $100 + 20 * 2$ = 140W

CKT2' Load = $100 + 20 * 2$ = 140W

CKT3’ Load = $100 + 20$ = 120W

Total load from CKTs = 400 W

Total Load From Power Socket = 4000W

ESDB Load = 400 * 0.7 + 4000 * 0.2 = 1080 W

ESDB Current = $\frac{1080}{220\times0.7} = 7.013A$

So, 10A SP MCCB is needed from ESDB to EMDB.

Calculation for ESDB Ground Floor:

In ESDBG1,

Pf = 0.7Total load = (100+20)*0.7= 84 W

$$I = \frac{84}{220 * 0.7}\ A = 0.545A$$

So, 5A SP MCCB is needed from ESDBG1 to EMDB & 2×1.5 rm BYM + 1.5 BYA ECC are used.

In ESDBG2,

Pf=0.7

Total load = 40 * 0.7 =28 W

$$I = \frac{28}{220 * 0.7}\ A = 0.1818A$$

So, 5A SP MCCB is needed ESDBG2 to EMDB & 2×1.5 rm BYM + 1.5 BYA ECC are used.

Main and Emergency Distribution Board

Previous Calculations:

SDBG1 = 20 A, 3086 W ESDBG1 = 0.545 A, 84 W

SDBG2 = 35.9 A, 5528 W ESDBG2 = 0.1818 A, 24 W

SDBT = 43.442 A, 6690 W ESDBT = 7.013 A, 1080 W

Utility Factor = 0.7

PF = 0.7, but after using PFI, improved PF = 0.95

V = 220 V

Wirings:

5A SP MCCB is needed from ESDBG1 to EMDB and 2×1.5 rm BYM + 1.5 BYA ECC are used.

5A SP MCCB is needed ESDBG2 to EMDB and 2×1.5 rm BYM + 1.5 BYA ECC are used.

10A SP MCCB is needed from ESDBT to EMDB and 2×2.5 rm BYM + 2.5 BYA ECC are used.

20A SP MCCB is needed from SDBG1 to MDB and 2*6 rm BYM + 6 rm BYA ECC are used.

40A SP MCCB is needed from SDBG2 to MDB and 2*16 rm BYM + 16 rm BYA ECC are used.

50 A SP MCCB is needed from SDBT to MDB and 2 × 25 rm BYM + 25 BYA ECC are used.

EMDB Calculations:

Power = [(ESDBT x 14) + (ESDBG1 + ESDBG2) + Lift] x Utility Factor

= 23610 W

P = 3*V*I*PF, here PF = 0.7

I=51.1 A

60 A SP MCCB is needed from SDBT to MDB and 4 × 35 rm NYY + 25 BYA ECC are used.

Generator Suggestion:

25 KW Generator is suggested.

MDB Calculations:

Power = {[(SDBT x 14) + (SDBG1 + SDBG2) + Pump] x Utility Factor} + EMDB

= 98701 W

P = 3*V*I*PF, here PF = 0.95

I=157.4 A

200 A TP MCCB is needed from SDBT to MDB and 4 × 150 rm NYY + 95 BYA ECC are used.

Transformer Suggestion:
S = P/PF
= 103.9 KVA
So, 125 KVA 11/0.415kV DYN 11, Oil Immersed Transformer with 4-6% impedance is needed.

PFI Plant:
cos θ = 0.7, sin θ = 0.714
Q = 3*V*I*sin θ = P*tan θ = 100.7 KVAR
After pf improvement, sin θ' = 0.312, cos θ' = 0.95
The reactive power supplied by the PFI plant = P(tan θ-tan θ')= 68.254 KVAR

I = = 157.4 A

So, a 200A TP MCCB is needed from PFI to MDB

LPS Calculation:

Building Length – 64'9"

Building width – 39'1"

Air Conductor Calculation:

One conductor at each of the 4 corner.

Maximum distance between 2 air conductor is 25'

So along width we need 1 air conductor at the middle where distance between 2 consecutive air conductor is 19'4"

And along length 2 air conductor is needed where distance between 2 consecutive air conductor is 21'7"

The perimeter of the building is 207'8"

So down conductor required is (207'8"/100) =

2.077 Down conductor required 3.

Reference(s):

Selection of Cables & Circuit Breakers Size

Table for Cables, Conduits, ECC, EL, Voltage drop and Current ratings of different specifications as per Manual of Eastern Cables, BICC cables and Tables, Electrical Conductors (International Standard Sizes) etc. :

A	B	C	D	E	F		G	H	I		J	
					a'	b'			a"	b"	a"'	B"'
3/0.029	1.5	5	16	10	6	10		27	27	22	16	20
7/0.029	2.5	10	16	10	4	7		16	36	30	22	28
7/0.036	4	15	14	10	3	5	1	10	47	39	30	37
7/0.044	6	20	14	10	2	4	1	6.8	59	50	38	47
7/0.052	10	30	10	10	1	2	1.5	4	78	68	52	63
7/0.064	16	40	10	10		1	1.5	2.6	100	94	70	85
19/0.052	25	50	6	6		1	2	1.6	130	125	91	110
19/0.064	35	60	6	6			2	1.2	155	160	112	136
19/0.072	50	70	6	6			2	0.93	185	195	136	164
19/0.083	70	100	1/0	1/0			2	0.65	225	245	173	207
37/0.072	95	120	1/0	1/0			2.5	0.48	270	300	216	253
37/0.083	120	150	1/0	1/0			2.5	0.4	310	350	244	291
37/0.093	150	200	1/0	1/0			3	0.34	350	405		333
37/0.130	185	250	3/0	3/0			3.5	0.29	390	460		381
61/0.093	240	300	3/0	3/0			4	0.24	450	555		452
61/0.103	300	425	3/0	3/0			4	0.22	515	640		526
91/0.093	400	585	3/0	3/0			6	0.2	586	770		639
91/0.103	500	685	3/0	3/0			6	0.18	680	900		752
127/0.103	630	800	3/0	3/0			6	0.17	800	1030		855

A : Single core cable construction diameter, inch .... as per Imperial Standard Size : B.S.S (old).
B : Single core cable construction area, mm^2 .... as per Metric Standard Size : VDE.
C : CB designed current rating amps.
D : ECC (Earth Continuity Conductor), SWG.
E : EL (Earthing Lead), SWG
F : No. of cables in
- a') 3/4" diameter conduit
- b') 1" diameter conduit

G : GI pipe diameter (for 4 – core cable), inch.
H : Volt drop /amp/meter, Vd in mV (For PVC insulated, non-armoured single core cable 600/1000 volts as per BICC Metric Supplement, page 20-22, September 1969).
I : Maximum Current rating (For Type : NYY to VDE 0271/3, 69)
- a") 30° C ambient temperature, underground, amps
- b") 35° C ambient temperature in air, amps

J : Maximum current carrying capacity (For Type : BYA to B.S. 6004 : 1975)
- a"') Bunched & Enclosed in conduit, two cables single phase at 35° C, amps
- b"') Clipped to a surface or on a cable tray bunched and un-enclosed two cables single phase at 35° C, amps

NYY : PVC insulated and PVC sheathed cable, rated voltage 600/1000 volts.
BYA : PVC insulated non-sheathed single core cable, rated voltage 450/750 volts.